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COMPENDIUM OF ANTARCTIC PENINSULA VISITOR SITES

2nd Edition

**A Report
to the
United States
ENVIRONMENTAL
PROTECTION
AGENCY**



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TABLE OF CONTENTS

INTRODUCTION to the 2nd EDITION	8
PART I — ANTARCTIC SITE INVENTORY	11
Design, purpose, and goals	13
Results	13
Table 1: Cumulative list of sites visited by Antarctic Site Inventory researchers by Antarctic Site Inventory subarea, 1989-2003	13
Antarctic Site Inventory methodology and work plan —	15
Subareas	15
Antarctic Peninsula map	16
Elephant Island subarea map	17
South Orkney Islands subarea map	17
Northeast Peninsula subarea map	18
South Shetland Islands subarea map	19
Northwest Peninsula subarea map	20
Southwest Peninsula subarea map	21
Data categories	22
Indicator species	23
Table 2: Indicator species	24
Census strategies	24
Regular Inventory censuses	26
Control and experimental colonies	27
Logistics	27
Long-term monitoring at key sites	28
Publications, reports, and papers	28
Details regarding Oceanites, Inc. and the Antarctic Site Inventory	29
Appendices to Part 1:	
Appendix 1: Chronological list of site visits by Antarctic Site Inventory researchers, 1994-2003	31
Appendix 2: Specific instructions for Antarctic Site Inventory researchers	41
Appendix 3: Improving Antarctic Site Inventory census methods	43
PART II — ANTARCTIC PENINSULA SITE DESCRIPTIONS	47
Inclusivity	48
Format	48
Copyright	49
Species identification	49
Census numbers	49
Table 3: Format for census data	49
Maps and photodocumentation	50
SITE DESCRIPTIONS: South Orkney Islands (SO)	51
SO subarea map	51
Sites (3)	
• Amphibolite Point (AMPH)	53
• Gibbon Bay (GIBB)	54
• Orcadas Station Vicinity (ORCA)	55

SITE DESCRIPTIONS: Elephant Island (EI)	57
EI subarea map	57
Sites (2)	
• Point Lookout (LOOK)	59
• Point Wild (WILD)	62
 SITE DESCRIPTIONS: Northeast Antarctic Peninsula (NE)	65
NE subarea map	66
Sites (24)	
• Bald Head (BALD)	67
• Brown Bluff (BROW)	68
• Camp Hill (HILL)	72
• Cape Burd (BURD)	73
• Crystal Hill (CRYS)	74
• Devil Island (DEVI)	75
• d'Urville Monument (DURV)	78
• Eagle Island (EAGL)	79
• Eden Rocks (EDEN) *	80
• False Head Point, Vega Island (FALS)	81
• Heroína Island (HERO)	82
• Hope Bay (HOPE)	85
• Jade Point (JADE) *	87
• Jonassen Island (JONA) *	88
• Madder Cliffs, Joinville Is. (MADD)	89
• Marambio Station Vicinity (MARA)	90
• Paulet Island (PAUL)	91
• Point Obelisk, James Ross Island (OBEL) *	97
• Penguin Point, Seymour Island (PEPO)	98
• Persson Island (PERS)	99
• Rum Cove, James Ross Island (RUMC)	100
• Snow Hill Island (SNOW)	101
• Tay Head, Joinville Island (TAYH)	103
• View Point (VIEW)	105
 SITE DESCRIPTIONS: South Shetland Islands (SH)	107
SH subarea map	108
Sites (17)	
• Aitcho Islands (AITC)	109
• Arctowski Station Vicinity, King George Is. (ARCT)	115
• Baily Head/Rancho Point, Deception Island (BAIL)	117
• Ferraz Station Vicinity, King George Island (FERR)	123
• Fort Point, Greenwich Is. (FORT)	125
• Half Moon Island (HALF)	127
• Hannah Point, Livingston Island (HANN)	131
• Jubany Station, King George Island (JUBA)	136
• Mitchell Cove, Robert Island (MITC)	137
• Pendulum Cove, Deception Island (PEND)	138
• Penguin Island (PENG)	141
• Robert Point, Robert Island (ROBE)	146
• Telefon Bay, Deception Island (TELE)	147
• Turret Point, King George Island (TURR)	149
• Vapour Col, Deception Island (VAPO) *	153
• Whaler's Bay, King George Island (WHAL)	154
• Yankee Harbor, Livingston Island (YANK)	159

SITE DESCRIPTIONS: Northwest Antarctic Peninsula (NW)	163
NW subarea map	164
Sites (23)	165
• Almirante Brown Station Vicinity, Paradise Bay (ALMI)	
• Astrolabe Island (ASTR)	168
• Bernardo O'Higgins Station (BERN)	170
• Cuverville Island (CUVE)	171
• Danco Island (DANC)	175
• Dorian Bay/Damoy Point (DORI)	177
• Foyn Harbor, Enterprise Is. (FOYN)	179
• Georges Point, Rongé Island (RONG)	180
• Gourdin Is. (GOUR)	183
• Gouvenørren Harbor (GOUV) *	186
• Hydrurga Rocks (HYDR)	187
• Jougla Point, Port Lockroy, Wiencke Island (LOCK)	190
• Lecointe Island (LECO) *	195
• Melchior Islands (MELC)	196
• Mikklesen Harbor, Trinity Island (MIKK)	197
• Neko Harbor, Andvord Bay (NEKO)	199
• Orne Islands (ORNE)	202
• Portal Point (POPT)	206
• Priest Is. (Goetschy Is.), Peltier Channel (PRIE) *	208
• Py Point (PYPT)	209
• Siffrey Point (SIFF)	211
• Sprightly Islands Vicinity (SPRI)	212
• Waterboat Point, Paradise Bay (WATE)	213
 SITE DESCRIPTIONS: Southwest Antarctic Peninsula (SW)	 217
SW subarea map	218
Sites (13)	
• Blaiklock Island (BLAI)	219
• Booth Island (Port Charcot) (BOOT)	220
• Detaille Island (DETA)	224
• Fish Islands (FISH)	225
• McCall Point (MCAL)	227
• Petermann Island (PETE)	228
• Pléneau Island (PLEN)	233
• Pourquoi-pas Island (POUR) **	236
• Prospect Point (PROS)	238
• Shumskiy Cove (SHUM)	239
• Stonington Island (STON)	240
• Vernadsky Station (VERN)	241
• Yalour Islands (YALO)	242

* = Sites visited by Antarctic Site Inventory researchers, but not specifically listed in compilations of site visit data for 1989-2003, prepared by the U.S. National Science Foundation Office Of Polar Programs (NSF/OPP), based on site visit data submitted by tour operators.

** = Another site not listed in the NSF/OPP compilations for the 1995-96 season, but visited in January 1996 by Antarctic Site Inventory researchers. More recently, expedition tour ships have made zodiac landings at Bongrain Point (67°43'S, 67°48'W), which forms the S side of the entrance to Dalgleish Bay on the W side of the Pourquoi-pas Island, and in Dalgleish Bay (67°42'S, 67°45'W) itself, both of which are close to where Inventory researchers visited in January 1996.

QUICK REFERENCE: PART II MAPS AND POSTERS

Subarea maps:

Elephant Island subarea (EI)	17, 57
South Orkney Islands subarea (SO)	17, 51
South Shetland Islands subarea (SH)	19, 108
Northeast Peninsula subarea (NE)	18, 66
Northwest Peninsula subarea (NW)	20, 164
Southwest Peninsula subarea (SW)	21, 218

Site-specific orientation maps:

EI Subarea	
Point Lookout (LOOK)	60
NE Subarea	
Paulet Island (PAUL)	94
SH Subarea	
Aitcho Islands (AITC)	
Western end	112
Eastern end	113
Baily Head, Deception Island (BAIL)	120
Half Moon Island (HALF)	128
Hannah Point, Livingston Island (HANN)	133
Penguin Island (PENG)	144
Turret Point (TURR)	150
Yankee Harbor, Greenwich Island (YANK)	160
NW Subarea	
Cuerville Island (CUVE)	173
Georges Point, Rongê Island (RONG)	181
Hydrurga Rocks (HYDR)	189
Jougla Point, Port Lockroy, Wiencke Is. (JOUNG)	193
Neko Harbor (NEKO)	201
Orne Island (ORNE)	205
Waterboat Point (WATE)	215
SW Subarea	
Booth Island (Port Charcot) (BOOT)	222
Petermann Island (PETE)	231
Pléneau Island (PLEN)	235

Site-specific posters, suggesting “pointers” for avoiding disruptions:

NE Subarea	
Brown Bluff (BROW)	71
Devil Island (DEVI)	77
Heroína Island (HERO)	83
Paulet Island (PAUL)	95
SH Subarea	
Aitcho Islands (AITC)	114
Baily Head, Deception Island (BAIL)	121
Hannah Point, Livingston Island (HANN)	134
Penguin Island (PENG)	145
Turret Point (TURR)	151
Whalers Bay, Deception Island (WHAL)	157
Yankee Harbor, Greenwich Island (YANK)	161
NW Subarea	
Gourdin Island (GOUR)	185

PART III — NUMBERS AND DISTRIBUTION OF ZODIAC LANDINGS AND VISITORS	243
Data sources	244
Disclaimer regarding compiled visitor data	244
Visitation trends	245
Table 4: ZODIAC LANDINGS IN ASI STUDY AREA	245
Table 5: SITES EXPERIENCING ZODIAC LANDINGS, BY ASI SUBAREA	246
Most heavily visited sites	247
Table 6: MOST HEAVILY VISITED SITES, 1989-99	247
Table 7: MOST HEAVILY VISITED SITES, 1999-2003	248
New visitor sites	249
Table 8: NEW VISITOR SITES	249
Sites visited each season; sites visited only once	250
Table 9: SITES VISITED EACH SEASON; SITES VISITED ONLY ONCE	250
Concentration of visits	251
Table 10: CONCENTRATION OF VISITS AT TOP 10-20 SITES	251
Appendices to Part III:	
Appendix 4: ZODIAC LANDINGS and VISITORS BY ZODIAC LANDINGS, Antarctic Peninsula, 1989-2003	253
Appendix 5: <i>Zodiac landings by tourist ships in the Antarctic Peninsula region, 1989-99, Polar Record 37 (201): 121-132 (2001)</i>	335
PART IV — SITE DIVERSITY AND SENSITIVITY TO POTENTIAL ENVIRONMENTAL DISRUPTIONS	347
Presence, absence checklists	349
Species diversity	349
Potential site sensitivities	349
Restricted visitor space	349
Attraction to diverse, sensitive sites	349
Population changes, trends	350
Appendices to Part IV:	
Appendix 6: Site diversity, sensitivity, and visitor space, by Antarctic Site Inventory subarea, 1994-2003	352
Appendix 7: <i>Censuses of penguin, blue-eyed shag, and southern giant petrel populations in the Antarctic Peninsula region, 1994-2000, Polar Record 36 (199): 323-334 (2000)</i>	362
Appendix 8: Peninsula penguin populations	374
PART V — REVIEW OF RECOMMENDATIONS PRESENTED IN 1st EDITION	375
Macro monitoring	377
Micro monitoring	377
Correlation studies	377
Non-specific site visit reporting	378
BIBLIOGRAPHY	379

Introduction to the 2nd Edition

This revision updates the *Compendium of Antarctic Peninsula Visitor Sites* to cover all 82 sites visited/censused by the Antarctic Site Inventory in nine field seasons, November 1994 through February 2003. In total, through February 2003, Inventory researchers have made 503 visits to these 82 sites. This second edition describes 31 new sites, revises subarea maps and orientation maps, adds a large number of site-specific photodocumentation, updates analyses of visitor frequency and distribution, and adds analyses and discussion of each site's species diversity and sensitivity to potential environmental disruptions. Previous site descriptions have been updated and all site descriptions have been reformatted for consistency and, hopefully, easier use.

In essence, the *Compendium* summarizes achievements of the Antarctic Site Inventory since it began collecting data in November 1994. The Inventory was intended to assist the implementation of the 1991 Protocol on Environmental Protection to the Antarctic Treaty, which, among other things, requires *a priori* environmental impact assessments for all human activities. In addition, the Protocol calls for monitoring, as and when necessary, to ensure that activities do not have unacceptable environmental impacts. Reflecting the Protocol's focus on the "initial environmental reference state" of particular locations, the *Compendium* sets forth baseline descriptive information and biological data regarding Antarctic Peninsula visitor sites the Antarctic Site Inventory has censused and surveyed.

Ultimately, in terms of monitoring and potential environmental impacts, the challenge will be identifying changes to a site's baseline reference state and, if possible, determining whether any detected changes are naturally occurring or anthropogenic, perhaps caused by tourism or other human activities. Potential impacts may be short-term or long-term, immediate or cumulative. (Benninghoff and Bonner, 1985; Abbott and Benninghoff, 1990; Woehler & Croxall, 1996; Emslie, 1997; Hofman and Jatko, 2002).

For the first edition of the *Compendium*, Oceanites was tasked by the UK and US governments with examining future assessment and monitoring needs under the Protocol, correlation studies that would improve the utility of Antarctic Site Inventory-like censuses, and prospects for improved site-visit reporting and analyses by tour operators and governments. It was found that the Antarctic Site Inventory had succeeded in efforts to:

- begin characterizing these sites in a meaningful manner, utilizing opportunistic shipboard visits;
- examine the numbers of visitors to these sites, and their distribution;
- choose indicator species (penguins, flying birds, seals, moss communities) that provide some indication of environmental changes at visitor sites;
- examine parameters and key variables related to the status or long-term reproductive viability of these indicator species (nest counts, chick counts);
- collect these data in a repetitive, consistent, and rigorous fashion from visit-to-visit and season-to-season;
- establish prospective "control" colonies whose productivity may be compared to the productivity of colonies visited by tourists;
- use statistically rigorous census methods; and
- use expedition ships and other shipboard platforms to reach heavily visited sites repetitively and, especially, at key times within a season for collecting relevant biological data.

Flowing from these results and findings, Oceanites recommended that:

- Treaty Parties should address a "macro" approach insuring that a range of visitor sites are censused at 3-5 year intervals;
- Treaty Parties should address a "micro" approach insuring that key biological and other parameters at vulnerable sites are assessed and monitored annually;
- The Antarctic Site Inventory and related projects should conduct correlation studies to insure that key biological data are collected at appropriate times, in accordance with CCAMLR protocols;
- Tour operators and organizers should insure that accurate names of Antarctic

Peninsula visitor sites are used in their site visit reports; and

- To enhance the usefulness of breeding chronology data generated by the Antarctic Site Inventory and related projects, Treaty Parties should insure that annual compilations (and any subsequent analyses) of site visit reports delineate, in greater detail, the exact timing of all visits and, concomitantly, the precise intervals between all visits.

The recommendations were supported by four appendices:

- Appendix A presented site descriptions, census data, and in many cases orientation maps and photographs of the 51 sites examined by the Antarctic Site Inventory project between 1994-97;
- Appendix B assessed the Antarctic shipboard tourism industry in depth; particularly, which Peninsula sites are visited most frequently, how visits are distributed, and which sites have the most species diversity, are most diverse attractive to visitors, and are most sensitive to potentially adverse environmental consequences;
- Appendix C examined the project's methodology; particularly, the project's ability to reach heavily visited sites at key times for data collection during each field season and whether the project's census methods can be improved. The methodology for the project is delineated in full; and
- Appendix D presented a bibliography of authorities utilized in preparing this report. analyze visitor frequency and distribution.

The site descriptive information in Appendix A proved especially useful to various interests concerned with potential, direct and cumulative impacts in the Peninsula, and how such potential impacts might be minimized, if not avoided altogether. This broad cohort of interests includes diplomats, scientists, environmentalists, expedition tour operators, and expedition leaders and staff.

As a result of this broad, international interest, the US Environmental Protection Agency, in commissioning a second edition of the *Compendium*, tasked Oceanites with updating such site descriptive data and information as thoroughly as possible.

PART I of this second edition describes various aspects of the Antarctic Site Inventory project, including:

- Design, purpose, and goals
- Overall results
- Methodology and rationale
 - Subareas
 - Overview map of the Antarctic Peninsula
 - Data categories
 - Indicator species
 - Census strategies
 - Regular Inventory censuses
 - Control and experimental colonies
 - Logistics
 - Long-term monitoring at key sites
- Recent publications
- Details regarding the nongovernmental education and science organization Oceanites, Inc. and the Antarctic Site Inventory

PART II contains descriptions of the 82 sites Inventory researchers have censused or surveyed from November 1994 through February 2003, arranged by subareas — the South Orkney Islands (SO), Elephant Island (EI),

Northeast Antarctic Peninsula (NE), South Shetland Islands (SH), Northwest Antarctic Peninsula (NW), and Southwest Antarctic Peninsula (SW).

For each site, the following aspects are noted:

- Location, history, prominent features (physical or topographical);
- Landing characteristics (if the site has been visited regularly);
- Antarctic Site Inventory effort, including a chronological listing of visits by Antarctic Site Inventory researchers, 1994-2003, and a summary of Inventory assessment and monitoring activity to date;
- Fauna (penguins, flying birds, wallowing seals) and flora (mosses, lichens, grass);
- Census data, if available;
- Conservation aspects, including sensitivity to potential environmental disruptions and suggestions (“pointers”) for avoiding potential disruptions; and
- Visitation aspects, noting the numbers of zodiac landings and visitors participating in such landings, over 14 seasons, from the 1989 to 2003, and other, proximate visitor sites.

There are orientation maps of 19 sites the Inventory regularly censuses. For 12 sites, there is a supplementary, one-page poster with photodocumentation and noting suggested “pointers” for avoiding potential disruptions.

PART III describes the distribution and frequency in the Antarctic Peninsula of zodiac landings and visitors participating in such zodiac landings. The most frequently visited sites, in terms of numbers of zodiac landings and participating visitors, are identified.

Appendix 4 presents distribution and frequency data for all sites that have experienced zodiac landings in the 1989-2003 period, and notes which activities other than zodiac landings have occurred at each site. This appendix also lists data regarding number of sites visited for the first time each season, and sites experiencing only one zodiac visit per season.

PART IV describes the effort of the Antarctic Site Inventory to assess the species diversity of all sites that are visited, as well as each site’s sensitivity to potential environmental disruptions. Appendix 7 presents the results of this assessment for all 82 sites the Antarctic Site Inventory has visited.

PART V discusses Oceanites’ previous recommendations (in the first edition of the *Compendium*), and whether, five years later, these concerns regarding future assessment and monitoring needs, fine-tuning the Inventory’s database, and improving site-visit reporting have been addressed.

A complete Bibliography of references is provided.